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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/898,389	07/03/2001	Zhaocheng Wang	450117-03249	3617

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EXAMINER	
TSEGAYE, SABA	

ART UNIT	PAPER NUMBER
2616	

DATE MAILED: 09/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/898,389	WANG ET AL.	
	Examiner	Art Unit	
	Saba Tsegaye	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office Action is in response to the amendment filed 08/04/06. Claims 17-42 are pending. Currently no claims are in condition for allowance.

Information Disclosure Statement

2. The information disclosure statement (IDS) filed July 3, 2001 has been considered and mailed on 09/21/05.

Claim Rejections - 35 USC § 112

3. Claims 17-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 17:

Line 4, the phrase "said second data stream" lacks antecedent basis.

Lines 7, 13 and 14, it is not clear whether "first pilot symbols" refers to the same first pilot symbols cited on line 6.

Lines 8, 14 and 16, it is not clear whether "second pilot symbols" refers to the same second pilot symbols cited on line 6.

Claim 18:

Line 2, it is not clear whether "first and second pilot symbols" refers to the same first and second pilot symbols cited on claim 1, line 6.

Claim 19:

Line 10, it is not clear whether "first pilot symbols" refers to the same first pilot symbols cited on line 6.

Lines 11-13, it is not clear whether "second pilot symbols (lines 11 and 13) and pairs of first pilot symbols (line 12)" refers to the same first and second pilot symbols cited on line 6.

Lines 14 and 15, it is not clear whether "pilot symbols" refers to the same first and second pilot symbols cited on line 6.

Claim 20:

Line 4, it is not clear whether "pilot symbols" refers to the same first and second pilot symbols cited on line 6 of claim 19.

Claim 21:

Lines 9-12, it is not clear whether "first pilot symbols and second pilot symbols" refers to the same first pilot symbols cited on line 5.

Line 13, the phrase "said pilot symbols" lacks antecedent basis.

Claim 22:

Line 5, it is not clear whether "pilot symbols" refers to the same first and second pilot symbols cited on line 5 of claim 21.

NOTE:

In claims 31-42, the word "*domains*" is used in several locations. Examiner suggests that "*dimension*" should be used for agreement with the specification.

Claim Rejections - 35 USC § 103

4. Claims 23-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dabak et al. (US 6,728,302) in view of Greenstein et al. (US 6,131,016).

Regarding claims 23, 25, 27, 29, 31, 33, 35, 37, and 39, Dabak discloses a transmitting device for transmitting signals in a wireless communication system with multiple transmission antennas comprising; a first and a second antenna means (Ant1 and Ant2) being arranged spaced apart from each other in a space diversity arrangement (column 2, lines 26-33); and pilot symbol generating means (100, 102) for generating pilot symbols to be transmitted among the data of the first and the second data stream (see fig. 3, as shown in fig. 1, multiplex circuit 118 selectively applies the pilot symbols at leads 100 and 102 to leads 120 and 122, respectively, at a time corresponding to pilot symbols), whereby first pilot symbols are transmitted via the first antenna and second pilot symbols are transmitted via the second antenna (column 2, lines 45-59). However, Dabak does not expressly disclose transmitting the first and the second data stream, respectively, in OFDM signal.

Greenstein teaches a transmit diversity, that is, transmission along multiple antennas (15, 16) at a transmitting base station (10). The transmit diversity can be combined with the transmission of a multiple carrier tone signals such as an orthogonal frequency division multiplexing signal that includes **one or more pilot tones** (see figs. 1-4 and column 1, lines 48-62; column 2, lines 44-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use OFDM signal, such as that suggested by Greenstein, in the Dabak system. The

motivation is that OFDM eliminates the requirement for guard bands to separate the frequencies and thereby avoid interference from adjacent RF channels.

Regarding claims 24, 26, 28,30, 32, 34, 36, 38, and 40, Dabak discloses all the claim limitations as stated above. Further, Dabak discloses that the pilot symbols at leads 100 and 102 are applied to multiplex circuit 118. Multiplex circuit 118 selectively applies the pilot symbols at leads 100 and 102 to leads 120 and 122, respectively, at a time corresponding to pilot symbols. However, Dabak dose not disclose transmitting the first and the second pilot symbols having the same frequency and time allocation are alternatingly identical and orthogonal to each other in the frequency and time dimension.

Greenstein teaches the principles of OFDM in combination with a plurality of transmitting antennas. Further, Greenstein teaches multi-carrier tones that comprise a plurality of carrier frequencies, which are transmitted substantially at the same time (see figs. 1 and 3, column 2, lines 32-52). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use OFDM signal, such as that suggested by Greenstein, in the Dabak system. The motivation is that OFDM eliminates the requirement for guard bands to separate the frequencies and thereby avoid interference from adjacent RF channels.

Regarding claims 19 and 20, Dabak discloses, in fig. 4, receiving device for receiving signal in a wireless system with space time transmit diversity comprising: a single antenna means (400) for receiving STTD encoded signals transmitted from a first (Ant1) and a second (Ant2) antenna means of a transmitting device (fig. 1) of communication system, the first (Ant1) and the

second (Ant2) antenna means transmitting corresponding pilot symbols respectively, processing means (404) for detecting pilot symbols in the received signals, for processing detected pilot symbols and performing a channel estimation on the basis of the processing to separately determine the transmission quality of signal transmitted from each of the first (Ant1) and the second (Ant2) antenna means (column 4, lines 25-57). However, Dabak dose not disclose the first and second pilot symbols correspond to one anther and have the same frequency and time allocation and a regular distribution in the time frequency dimension in the OFDM system, and wherein pairs of first pilot symbols adjacent in the frequency dimension are respectively orthogonal to the corresponding pairs of second pilot symbols and pairs of first pilot symbols adjacent in the time dimension are respectively orthogonal to the corresponding pairs of second pilot symbols.

Greenstein teaches a transmit diversity, that is, transmission along multiple antennas (15, 16) at a transmitting base station (10). The transmit diversity can be combined with the transmission of a multiple carrier tone signals such as an orthogonal frequency division multiplexing signal that includes **one or more pilot tones** (see figs. 1-4 and column 1, lines 48-62; column 2, lines 44-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use OFDM signal, such as that suggested by Greenstein, in the Dabak system. The motivation is that OFDM eliminates the requirement for guard bands to separate the frequencies and thereby avoid interference from adjacent RF channels and enhance the reception of the information signals at the wireless communication terminal (column 1, lines 60-61).

Regarding claim 21, Dabak discloses a transmitting device for transmitting signals in a wireless communication system with multiple transmission antennas comprising; a first and a second antenna means (Ant1 and Ant2) being arranged spaced apart from each other in a space diversity arrangement (column 2, lines 26-33); and pilot generating means (100, 102) for generating pilot symbols to be transmitted among the data of the first and the second data stream, whereby first pilot symbols are transmitted via the first antenna and second pilot symbols are transmitted via the second antenna (column 2, lines 45-59); receiving the pilot symbols in a single antenna or a receiving device; and processing the pilot symbols and performing a channel estimation on the basis of the processing to separately determine the transmission quality of signal transmitted from each of the first (Ant1) and the second (Ant2) antenna means (column 4, lines 25-57). However, Dabak does not expressly disclose transmitting the first and the second data stream, respectively, in OFDM signal.

Greenstein teaches a transmit diversity, that is, transmission along multiple antennas (15, 16) at a transmitting base station (10). The transmit diversity can be combined with the transmission of a multiple carrier tone signals such as an orthogonal frequency division multiplexing signal that includes **one or more pilot tones** (see figs. 1-4 and column 1, lines 48-62; column 2, lines 44-52; column 8, lines 5-8).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use OFDM signal, such as that suggested by Greenstein, in the Dabak system. The motivation is that OFDM eliminates the requirement for guard bands to separate the frequencies and thereby avoid interference from adjacent RF channels and enhance the reception of the information signals at the wireless communication terminal (column 1, lines 60-61).

Regarding **claim 22,** Dabak discloses all the claim limitations as stated above. Further, Dabak discloses that the pilot symbols at leads 100 and 102 are applied to multiplex circuit 118. Multiplex circuit 118 selectively applies the pilot symbols at leads 100 and 102 to leads 120 and 122, respectively, at a time corresponding to pilot symbols. However, Dabak dose not disclose transmitting the first and the second pilot symbols having the same frequency and time allocation are alternatingly identical and orthogonal to each other in the frequency and time dimension.

Greenstein teaches the principles of OFDM in combination with a plurality of transmitting antennas. Further, Greenstein teaches multi-carrier tones that comprise a plurality of carrier frequencies, which are transmitted substantially at the same time (see figs. 1 and 3, column 2, lines 32-52). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use OFDM signal, such as that suggested by Greenstein, in the Dabak system. The motivation is that OFDM eliminates the requirement for guard bands to separate the frequencies and thereby avoid interference from adjacent RF channels.

Regarding claim 41, Dabak discloses a transmitting device for transmitting signals in a wireless communication system with multiple transmission antennas; the device comprising:

Symbol generating means for generating the data symbols and the pilot symbols, wherein the symbol generating means generates first pilot symbols and second pilot symbols, wherein the first pilot symbols and second pilot symbols are of the same type, and a first transmission antenna of the plurality of transmission antennas transmits the first pilot symbols and a second transmission antenna of the plurality of transmission antennas transmits the second pilot symbols

(see figs. 2 and 3; column 2, lines 26-59). However, Dabak does not expressly disclose transmitting the first and the second data stream, respectively, in OFDM signal.

Greenstein teaches a transmit diversity, that is, transmission along multiple antennas (15, 16) at a transmitting base station (10). The transmit diversity can be combined with the transmission of a multiple carrier tone signals such as an orthogonal frequency division multiplexing signal that includes **one or more pilot tones** (see figs. 1-4 and column 1, lines 48-62; column 2, lines 44-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use OFDM signal, such as that suggested by Greenstein, in the Dabak system. The motivation is that OFDM eliminates the requirement for guard bands to separate the frequencies and thereby avoid interference from adjacent RF channels.

Regarding claim 42, Dabak discloses all the claim limitations as stated above. Further, Dabak discloses that the pilot symbols at leads 100 and 102 are applied to multiplex circuit 118. Multiplex circuit 118 selectively applies the pilot symbols at leads 100 and 102 to leads 120 and 122, respectively, at a time corresponding to pilot symbols. However, Dabak dose not disclose transmitting the first and the second pilot symbols having the same frequency and time allocation are alternatingly identical and orthogonal to each other in the frequency and time dimension.

Greenstein teaches the principles of OFDM in combination with a plurality of transmitting antennas. Further, Greenstein teaches multi-carrier tones that comprise a plurality of carrier frequencies, which are transmitted substantially at the same time (see figs. 1 and 3, column 2, lines 32-52). It would have been obvious to one of ordinary skill in the art at the time

the invention was made to use OFDM signal, such as that suggested by Greenstein, in the Dabak system. The motivation is that OFDM eliminates the requirement for guard bands to separate the frequencies and thereby avoid interference from adjacent RF channels.

Allowable Subject Matter

5. Claims 17-22 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

Response to Arguments

6. Applicant's arguments with respect to claims 17-42 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Saba Tsegaye whose telephone number is (571) 272-3091. The examiner can normally be reached on Monday-Friday (7:30-5:00), First Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on (571) 272-7629. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ST
August 29, 2006

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